REPLACEMENT SHEET
Title: Method and Apparatus for Forwarding Traffic Between Locally
Attached Networks Using Level 3 Addressing Information
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FIG. 1
(Prior Art)

REPLACEMENT SHEET
Title: Method and Apparatus for Forwarding Traffic Between Locally
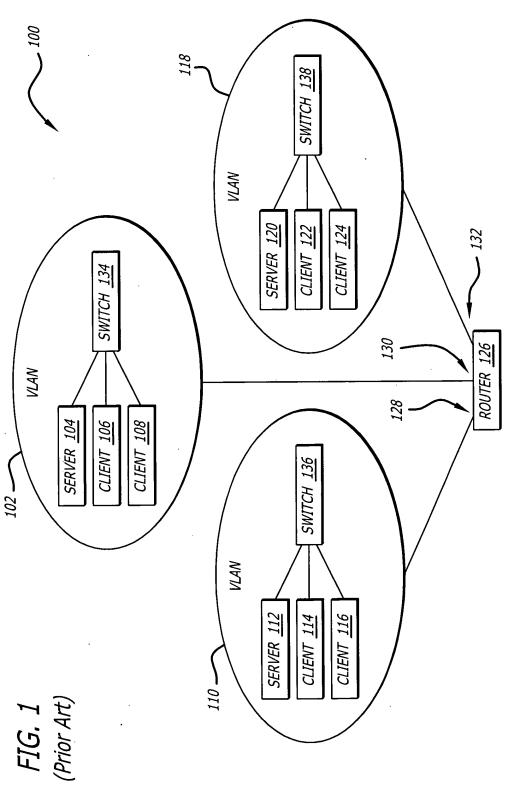Attached Networks Using Level 3 Addressing Information
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FIG. 2

100

118

VLAN

SWITCH 138

SERVER 120
CLIENT 122
CLIENT 124

102

VLAN

SWITCH 134

SERVER 104
CLIENT 106
CLIENT 108

206

204

202

132

130

128

LEARNING SWITCH 200

ROUTER 126

110

VLAN

SWITCH 136
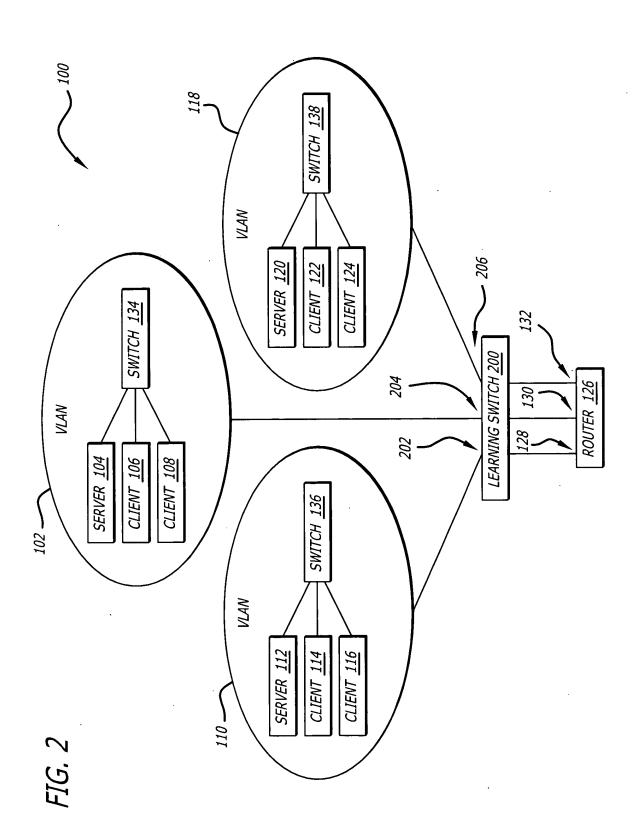
SERVER 112
CLIENT 114
CLIENT 116

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FIG. 3a

300 SOURCE-DEV DETERMINES THAT DEST-DEV IS NOT A MEMBER OF SOURCE-VLAN BASED ON DDL3

302 SOURCE-DEV TRANSMITS AN ARP QUERY THAT REQUESTS THE L2 ADDRESS ASSOCIATED WITH DGL3

304 SWITCH 200 RECEIVES THE ARP QUERY THROUGH THE PORT OF SWITCH 200 THAT CORRESPONDS TO DG AND INSPECTS THE PROTOCOL-TYPE INFORMATION IN THE ARP QUERY TO DETERMINE THAT THE PACKET IS AN ARP QUERY

306 SWITCH 200 READS THE L2 SOURCE ADDRESS (SA) AND THE L3 SOURCE ADDRESS (SNLA) FROM THE ARP QUERY

308 THE SWITCH 200 STORES DATA INDICATING THAT (1) SDL2 IS THE L2 ADDRESS THAT CORRESPONDS TO SDL3 AND (2) THE DEVICE THAT HAS THE L2 ADDRESS SDL2 IS CONNECTED TO THE PORT OF SWITCH 200 ON WHICH THE ARP QUERY ARRIVED

310 THE SWITCH 200 FORWARDS THE ARP QUERY TO THE PORT OF ROUTER 126 THAT CORRESPONDS TO THE PORT ON WHICH SWITCH 200 RECEIVED THE ARP QUERY

312 ROUTER 126 TRANSMITS A RESPONSE TO THE ARP QUERY THROUGH DG
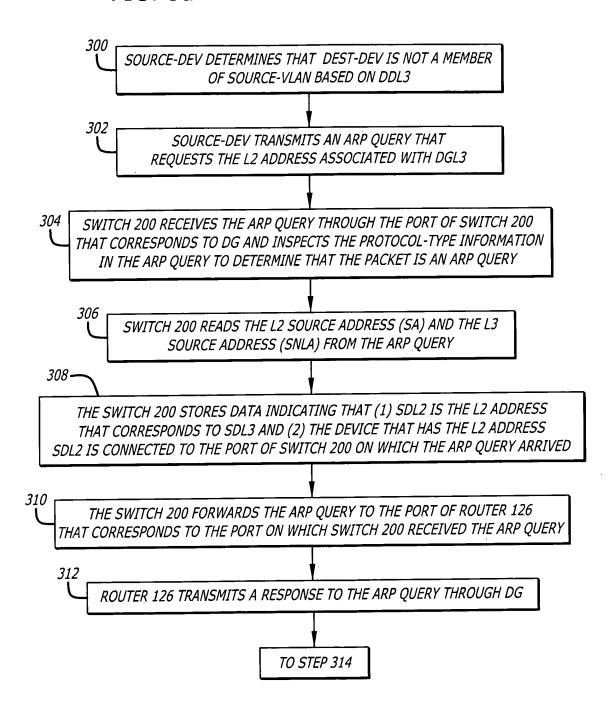
TO STEP 314

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FIG. 3b

```
                    ┌─────────────────────┐
                    │      FROM 312        │
                    └─────────────────────┘
                               │
                               ▼
314 ─── ┌───────────────────────────────────────────────┐
        │   SWITCH 200 RECEIVES THE ARP RESPONSE FROM DG │
        └───────────────────────────────────────────────┘
                               │
                               ▼
316 ─── ┌───────────────────────────────────────────────┐
        │ SWITCH 200 READS THE SNLA SPECIFIED IN THE ARP │
        │   RESPONSE TO DETERMINE IF THE ARP RESPONSE    │
        │                  IS FROM DG                    │
        └───────────────────────────────────────────────┘
                               │
                               ▼
318 ─── ┌───────────────────────────────────────────────┐
        │  SWITCH 200 STORES DATA INDICATING THAT DGL2   │
        │    IS THE L2 ADDRESS THAT CORRESPONDS TO DGL3  │
        └───────────────────────────────────────────────┘
                               │
                               ▼
320 ─── ┌───────────────────────────────────────────────┐
        │ SWITCH 200 FORWARDS THE ARP RESPONSE TO SOURCE-DEV │
        └───────────────────────────────────────────────┘
```

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1st Named Inventor: Steve Ames
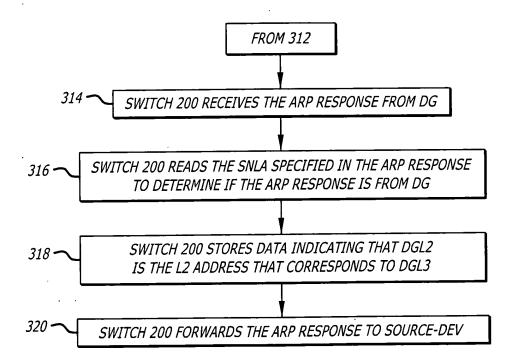Application No.: 09/488,945   Docket No.: 82771P118C
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FROM 602

606 — IS PROXY FORWARDING ENABLED ?

NO

YES

616 — DA=ROUTER PORT ?

NO

YES

618 — IS THE L2 ADDRESS THAT CORRESPONDS TO DNLA OF PACKET KNOWN ?

NO

YES

TO 612

620 — SET DA IN PACKET TO THE L2 ADDRESS THAT CORRESPONDS TO THE DNLA, SET SA IN PACKET TO THE L2 ADDRESS OF THE APPROPRIATE PORT OF ROUTER 126, AND TRANSMIT THE PACKET THROUGH THE APPROPRIATE INTERFACE

FIG. 6b

REPLACEMENT SHEET
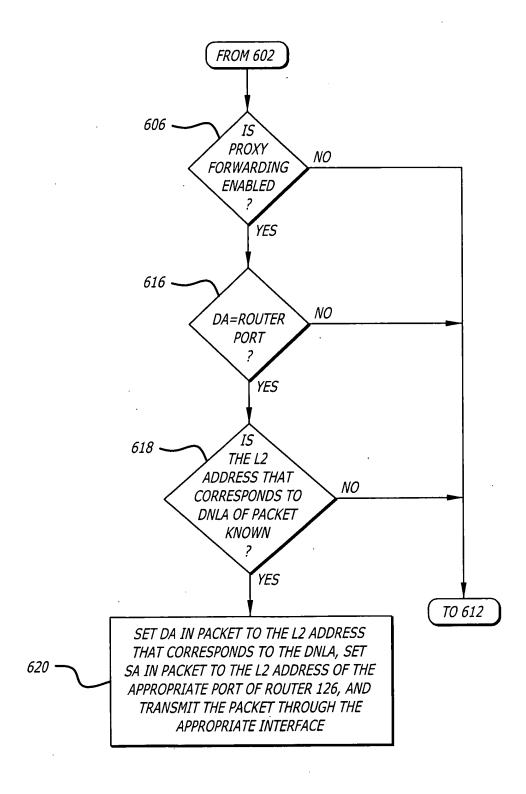Title: Method and Apparatus for Forwarding Traffic Between Locally
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FIG. 4a

```
                                                                    ⌐ 400
┌──────────────────────────────────────────────────────────────────────┐
│ SOURCE-DEV ENCAPSULATES THE MESSAGE IN A PACKET AND TRANSMITS THE PACKET │
└──────────────────────────────────────────────────────────────────────┘
                              │
                              ▼
              ┌──────────────────────────────────┐
              │ SWITCH 200 RECEIVES THE PACKET AT THE PORT OF │  ⌐ 402
              │ SWITCH 200 THAT CORRESPONDS TO DG │
              └──────────────────────────────────┘
```

406

SWITCH 200
FORWARDS
THE PACKET
TO DG ON
ROUTER 126
USING
L2 SWITCHING

404

HAS
SWITCH 200
ALREADY STORED THE
L2 ADDRESS ASSOCIATED
WITH DDL3
?

NO   YES

408

SWITCH 200
FORWARDS
THE PACKET
DIRECTLY TO
THE DEST-DEV
(STEP 408)

DG RECEIVES THE PACKET AND DETERMINES THE OUTBOUND PORT
TO WHICH DEST-DEV IS ATTACHED (OP) THROUGH AN L3 LOOKUP   ⌐ 410

TO 412

REPLACEMENT SHEET
Title: Method and Apparatus for Forwarding Traffic Between Locally
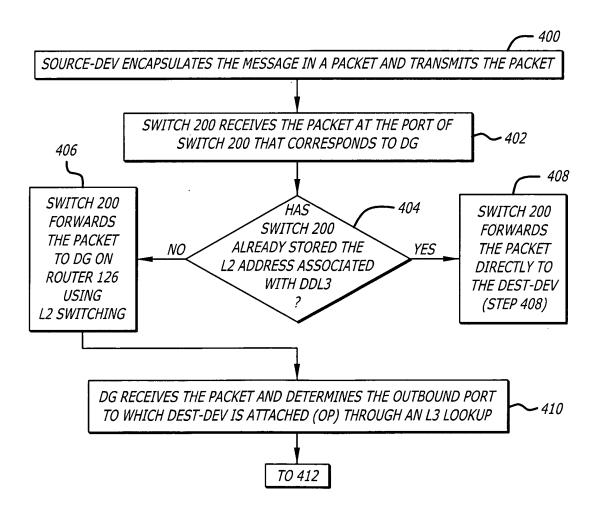Attached Networks Using Level 3 Addressing Information
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FIG. 4b

FROM 410

ROUTER 126 SENDS AN ARP QUERY THROUGH OP TO DETERMINE DDL2 — 412

SWITCH 200 RECEIVES THE ARP QUERY AND LEARNS FROM THE CONTROL INFORMATION CONTAINED IN THE ARP QUERY THAT THE L2 ADDRESS ASSOCIATED WITH OPL3 IS OPL2 — 414

SWITCH 200 FORWARDS THE ARP QUERY TO DEST-VLAN THROUGH THE PORT OF SWITCH 200 THAT CORRESPONDS TO THE OUTBOUND PORT ON WHICH ROUTER 126 SENT THE ARP QUERY — 416

THE L2 SWITCH IN DEST-VLAN BROADCASTS THE ARP QUERY TO ALL OF THE MEMBERS OF DEST-VLAN — 418

DEST-VLAN RECEIVES THE ARP QUERY AND TRANSMITS AN ARP RESPONSE TO THE ARP QUERY — 420

TO 422

REPLACEMENT SHEET
Title: Method and Apparatus for Forwarding Traffic Between Locally
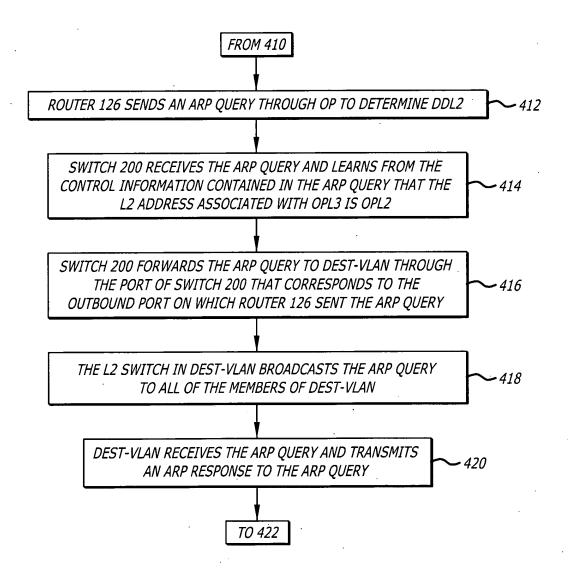Attached Networks Using Level 3 Addressing Information
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```
                        ┌──────────────┐
                        │   FROM 420   │
                        └──────────────┘
                               │
                               ▼
              ┌───────────────────────────────┐
              │  SWITCH 200 STORES DATA        │
              │  INDICATING THAT DDL2 IS       │── 422
              │  THE L2 ADDRESS ASSOCIATED     │
              │  WITH DDL3                     │
              └───────────────────────────────┘
                               │
                               ▼
              ┌───────────────────────────────┐
              │  SWITCH 200 FORWARDS THE       │── 424
              │  ARP RESPONSE TO ROUTER 126    │
              └───────────────────────────────┘
                               │
                               ▼
              ┌───────────────────────────────┐
              │  ROUTER 126 TRANMITS THE PACKET│── 426
              │  THROUGH SWITCH 200 TO DEST-VLAN│
              └───────────────────────────────┘
                               │
                               ▼
              ┌───────────────────────────────┐
              │  DEST-DEV RECEIVES THE PACKET  │── 428
              │  CONTAINING THE MESSAGE        │
              │  FROM SOURCE-DEV               │
              └───────────────────────────────┘
```
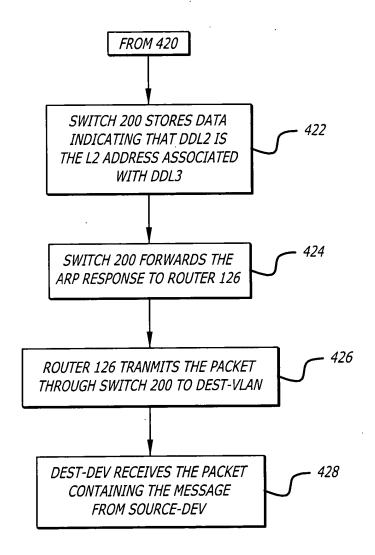
FIG. 4c

REPLACEMENT SHEET
Title: Method and Apparatus for Forwarding Traffic Between Locally
Attached Networks Using Level 3 Addressing Information
1st Named Inventor: Steve Ames
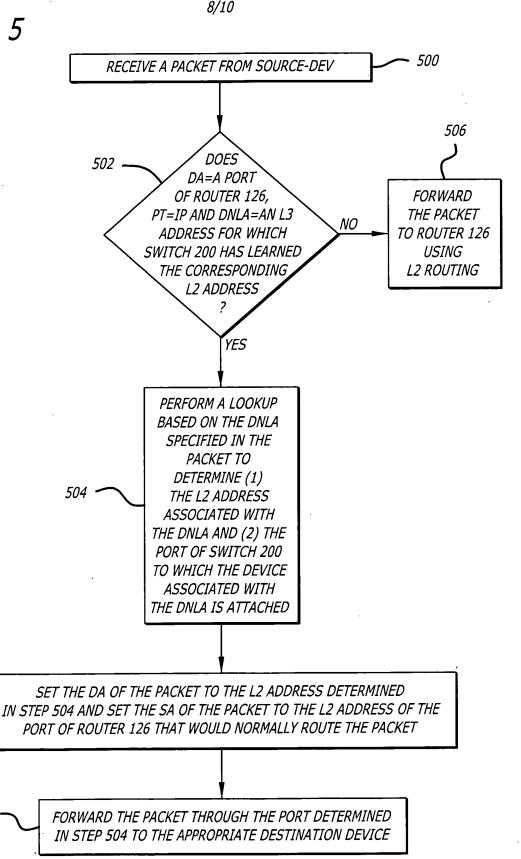Application No.: 09/488,945   Docket No.: 82771P118C
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FIG. 5

RECEIVE A PACKET FROM SOURCE-DEV — 500

502 — DOES DA=A PORT OF ROUTER 126, PT=IP AND DNLA=AN L3 ADDRESS FOR WHICH SWITCH 200 HAS LEARNED THE CORRESPONDING L2 ADDRESS ?

NO →

506
FORWARD THE PACKET TO ROUTER 126 USING L2 ROUTING

YES

504 — PERFORM A LOOKUP BASED ON THE DNLA SPECIFIED IN THE PACKET TO DETERMINE (1) THE L2 ADDRESS ASSOCIATED WITH THE DNLA AND (2) THE PORT OF SWITCH 200 TO WHICH THE DEVICE ASSOCIATED WITH THE DNLA IS ATTACHED

508
SET THE DA OF THE PACKET TO THE L2 ADDRESS DETERMINED IN STEP 504 AND SET THE SA OF THE PACKET TO THE L2 ADDRESS OF THE PORT OF ROUTER 126 THAT WOULD NORMALLY ROUTE THE PACKET

510 — FORWARD THE PACKET THROUGH THE PORT DETERMINED IN STEP 504 TO THE APPROPRIATE DESTINATION DEVICE

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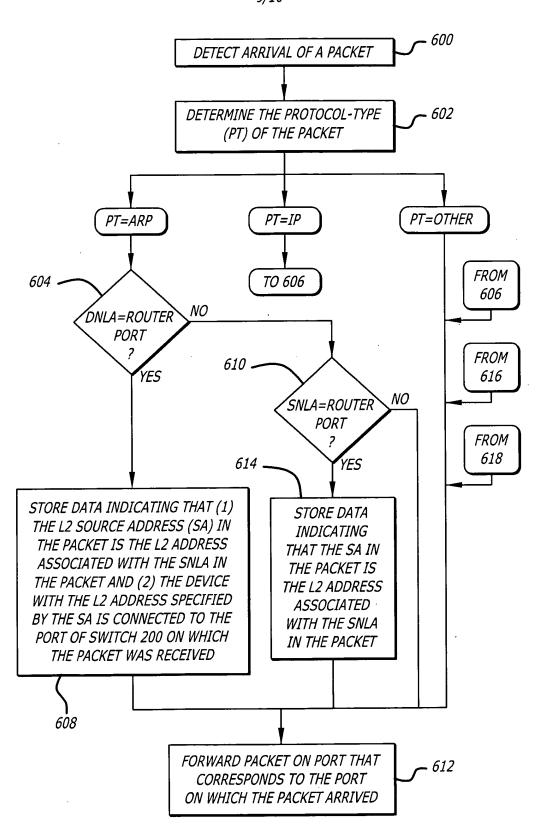1st Named Inventor: Steve Ames
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DETECT ARRIVAL OF A PACKET — 600

DETERMINE THE PROTOCOL-TYPE (PT) OF THE PACKET — 602

PT=ARP

PT=IP

PT=OTHER

TO 606

FROM 606

FROM 616

FROM 618

604 — DNLA=ROUTER PORT ? — NO

YES

610 — SNLA=ROUTER PORT ? — NO

YES

STORE DATA INDICATING THAT (1) THE L2 SOURCE ADDRESS (SA) IN THE PACKET IS THE L2 ADDRESS ASSOCIATED WITH THE SNLA IN THE PACKET AND (2) THE DEVICE WITH THE L2 ADDRESS SPECIFIED BY THE SA IS CONNECTED TO THE PORT OF SWITCH 200 ON WHICH THE PACKET WAS RECEIVED

608

614 — STORE DATA INDICATING THAT THE SA IN THE PACKET IS THE L2 ADDRESS ASSOCIATED WITH THE SNLA IN THE PACKET

FORWARD PACKET ON PORT THAT CORRESPONDS TO THE PORT ON WHICH THE PACKET ARRIVED — 612

FIG. 6a